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ABSTRACT

When Piaget ascribed the origin of knowledge to action, he distanced his theory from most other theories of the origins of mind. As a result, Piaget's conception of mental action has been quite controversial. Piaget's recent, functionalist revisions emphasize procedures and their role in the development of structures. In the new view, structures have their origins in procedures, not simply in actions alone. When mental actions are defined as "signifying implications," they are logical. Though mental actions are not physical, they are also neither linguistic nor perceptual. Dissatisfied with the emphasis he had placed on truth-table extensional logics, Piaget later sought a new theory of meaning based on intensional logic, a logic entailing implications. Piaget's discussion of protologics, the nascent logical forms that underlie sensorimotor activity, indicates that even though functions are emphasized, structures are not fully rejected. The nature of the logical system Piaget alludes to is based on implications and inferences, and the logic of meaning so elaborated is the preparation for operatory logic. Piaget's new functionalism also posits new sources of disequilibrium, emphasizes contradictions in cognitive systems, considers the role of negation in cognitive conflict, and offers revisions of the conception of equilibration and the vocabulary of Piagetian concepts. (RH)

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Jean Piaget: The Old Theory and the New

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Presented at the 1989 Society for Research in Child Development Meetings (Kansas City, Mo.) in the Symposium: Theories of Child Development: Updates and Reformulations (R. Vasta, Chair).

A fuller exposition of the ideas in this presentation will be found in: Beilin, H. (in press, 1989). Piagetian Theory. In R. Vasta (Ed.), Six Theories of Child Development: Revised Formulations and Current Issues. Annals of Child Development Vol. 6. JAI Press.

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The recent theory is based on a wealth of new, and as usual, clever studies. Some have already been translated into English, but others are still in press. Many old issues are given new interpretations, and new data have led to new formulations. The most striking indication of the new functionalism is Piaget's discussion of strategies and procedural knowledge. The procedures and strategies children evidence in problem solving and reasoning have routinely been reported in Piaget's observational and experimental protocols. What is new is the theoretical attention given to procedures and the delineation of their role in the development of structures. The magnitude of the change in view appears in the assertion, "Every structure is the result of a procedural construction, and every procedure makes use of some aspects of structure" (Inhelder&Piaget,1980). In other words, structures have their origins in procedures, not simply in actions alone. Such procedures utilize or carry out transformations in achieving specific goals. Consequently, they are temporal processes, connected in serial fashion. In contrast, structures link transformations into an atemporal system by extracting connections from these temporally related sequences. Procedures play a role even in the correspondences and morphisms that typify preoperational thought. In fact, positing these preoperational correspondences forced Piaget into radically altering his claim that all cognitive functions are based on transformations. He recognized that cognitive structures can arise from mental actions on static states.

In general, Piaget's conception of mental action has been quite controversial, since in ascribing the origin of knowledge to action rather than to either perception or language, Piaget distanced his theory from most other theories of the origins of mind. Despite eventual agreement of most

investigators with Piaget's idea that the subject is active in the creation or acquisition of knowledge, the nature of mental action itself has not been clear. This was particularly so when it appeared that mental action had attributes of physical action. In The Grasp of Consciousness and other recent works, Piaget defines mental actions as, "signifying implications", that is, mental actions may be said to be conditions that imply other conditions, or one proposition (or concept) is contained in another proposition (or concept) that implies it. Conscious states, for example, from goal-oriented actions to higher level conceptualizations, express meanings that are connected by logical implications. When translated into language and mental images, mental actions and their contents can be considered signifying representations. Thus, actions in mind are logical in nature, and while not physical they are also neither linguistic nor perceptual. The significance of the system of signifying implications is that it provides understanding and meaning that extracts the reasons for things from objects, and is an adjunct to the processes that affect the application or use of things.

The emphasis on meaning and the system of signifying implications has more profound significance, however, in that it reflects on the change in direction the theory was taking that resulted in the most striking rethinking of the nature of the theory since Piaget's introduction of logico-mathematical models in the 1940s. The change was signalled in a note that appeared in 1980, the year of Piaget's death, in which he declared he had been in error in placing as much emphasis as he had (in the standard theory) on truth-table extensional logics. It had been this logical system that led to the grouping and group structures that are mapped onto the structures of concrete and formal operational thought. What was now required, he wrote, was a new

theory of meaning based on intensional logic, a logic entailing implications. Consequently, he felt that only a "decanted" version of the older logics would remain when the new theory of meaning was completed. His death occurred when this re-examination was only partially done, so that the French version, and the English version, to be published by Erlbaum, do not indicate what would remain in the decanted version of the older theory. This new proposal has stirred some controversy: some friendly critics have argued for the virtues of alternative logics, such as modal logic (le Bonniec) or category theory as more adequate models for the organization of human thought. In any case, it should be clear that Piaget himself was not content with the logical models he employed, so that his older models need further critical scrutiny and the search for more adequate structural models should continue.

The evidence that Piaget did not fully reject structure in his later theorizing appears in his discussion of "protologics", the nascent logical forms that he believed underlie sensorimotor activity. He expressed "astonishment," in fact, in finding the 16 binary operators of propositional logic at the level of coordinations among actions, long before the appearance at 11 or 12 years of formal operations. Developmental psychologists, who for some time have argued that evidence of logical cognition appears long before concrete and logical thought will undoubtedly take heart from Piaget's "astonishment." Again, however, the nature of the logical system Piaget is alluding to is based on implications and inferences, and the logic of meaning so elaborated is the preparation for operatory logic. In the past, operatory logic was associated primarily with extensional logic and the truth-testing of propositions, but now its origins are more clearly in intension and the logic of meaning.

To return to the more functionalist aspects of the theory, it was a tenet of the standard theory that developmental change is fueled by cognitive conflict that results in disequilibrium, which in turn leads to cognitive reorganization and at least to partial re-equilibrium. In the new view, conflict is only one source of disequilibrium. Others include oppositions and adaptive failure; all of which add up to contradictions in cognitive systems. Further, contradiction depends on the contents of thought and action, not solely on conflicts of a logical or formal nature.

New emphasis is also placed on the role of negation in cognitive development. Every action, Piaget points out, even if directed to some goal, and by definition is positive and affirmative, effects a change or negates an initial state. So, too, with operations, each of which entails an inverse operation. Thus, every cognitive activity whether physical or mental consists of positive elements that are complemented by negative elements. Nonetheless, it is an empirical fact that young children, at elementary levels of thought, focus on the positive to the neglect of the negative. This often leads to lack of success in a variety of tasks, and to all sorts of conflicts and contradictions, which the young child may not have the resources to resolve. Only with the development of operational understanding, in which inverse and reciprocal relations become integrated into operations, do affirmations become balanced by negations, and the earlier predominance of affirmations compensated. In this scheme, contradictions are incomplete compensations between affirmations and negations. Consequently, natural thought, with its successions of disequilibria (based on contradictions) and re-equilibrations, falls within the scope of the same mechanisms that underlie the relations of affirmations to negations. Again, what Piaget has done is to redirect attention

from the formal and logical aspects of contradiction and conflict to their functional features, and to the contents of thought and action as such.

Further, the purported transition from equilibrated to disequilibrated states has troubled a number of observers, including Piaget himself. For how, if a system is in equilibrium, can it lead to further development? Piaget's solution is complex, but at least one feature of his newer theory of equilibration should be mentioned here. Inasmuch as equilibrations are ordinarily the consequence of restructurings or structuring based on the integration of new and old features into a new organization, each new achievement opens wholly new ranges of possibility for thought and action. Just as newly acquired walking and other motor capacities, or newly acquired language competence, enormously extend the range of physical and intellectual possibilities, so to a lesser or greater extent, does each new structuring introduce new possibilities for both success and failure, and thus new contradictions and disequilibria. Consequently, even the most advanced and sophisticated cognitive system is never closed, not as long as the system contains within it the seeds of new possibilities. With new possibilities, however, come new constraints as well, and these lead to the necessary forms that emerge in development. Thus, cognitive development in this view never ends for the individual or for the species. It might appear, from what one knew of the earlier theory, that operations would be the source of new possibilities, but for Piaget's new theory the opposite is true. Possibility becomes the source of operations, as possibility, necessity, and reality are differentiated and coordinated within the revised conception of equilibration.

Due to the constraints of time, I have only been able to touch on a few of the features of Piaget's new theory. I can only allude to his revised

conception of causality, to the nature of consciousness, to reflective abstraction, which is generally poorly understood, to the role of the social in cognitive development, which many mistakenly believe is given no place in his theory, and to the history of science. The new theory also introduces a revised vocabulary of Piagetian concepts: a new classification of schemes, for example, includes presentative schemes, procedural schemes, and operational schemes. In addition, gone is the dichotomy between the epistemic subject and the psychological subject: in its place are the individual subject, the common/general subject, that is temporal and causal, and the epistemic or nontemporal, and exclusively implicative, subject.

Aside from the conceptual and lexical changes outlined, what is the larger significance of the changes in the theory? They acknowledge, for one thing, the general legitimacy of trends in recent cognitive and developmental research in the direction of understanding the role of function and process in development. But they also introduce a cautionary and prescriptive note with respect to this change. Earlier functionalisms deprived developmental theory of powerful modes of explanation and description by rejecting and neglecting structural forms of explanation, whether logical or otherwise. Contemporary cognitive theory does not fully do this, in the ways of radical behaviorism, for example, but in the present inclination toward contextualist and other one-sided forms of functionalism cognitive theory is in danger of offering an anemic conception of development, of which Piaget's theory itself could never have been accused.